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the Sierra Madre, near Monterey, Nuevo Leon, *Pringle*, nos. 2222, 2412. Type in herb. Gray. This species is reported by Mr. J. Donnell Smith (Intercont. Ry. Comm. i. pt. 2, append. 3, 12) as collected at Cael, Guatemala, but from the extraordinary extension of range we are forced to doubt the identity of the Guatemalan plant (which we have not seen) with the North Mexican species.

* * Rays none.

12. *Z. DISCOIDEA*, Gray. Stem simple, erect, 7 dm. high, canescent-tomentulose: leaves round-ovate, crenate-dentate, scarcely acute, pale green above, white-tomentose beneath, 9 cm. long, 8 cm. broad, truncate or subcordate at the base but cuneate at the insertion of the petiole (1 to 1.4 cm. long): heads numerous, small, in a dense almost naked terminal corymb. — Proc. Am. Acad. xxi. 388. — Rocky hills near Chihuahua, *Pringle*, no. 309; along road between Cerro Prieto and La Providencia, State of Durango, 11 September, 1898, *E. W. Nelson*, no. 4970. Type in herb. Gray.

II. — SYNOPSIS OF THE GENUS VERBESINA, WITH AN ANALYTICAL KEY TO THE SPECIES.

By B. L. ROBINSON and J. M. GREENMAN.

THE genus *Verbesina* has not been revised as a whole since its treatment in the fifth volume of the *Prodromus* (1836). In this work DeCandolle describes 33 species with definiteness and appends 8 more indefinitely as “non satis notæ.” All but 2 of these 41 species were American. DeCandolle divides the genus into three sections: *Verbesinaria* with radiate heads and straight pappus-awns, *Hamulium* with radiate heads and uncinat awns, and *Platypterus* with discoid heads. In 1883, Dr. Gray (Proc. Am. Acad. xix. 11–15) synopsized the North American, West Indian, and Mexican forms known to him, adding to the sections *Ximenesia* with loose herbaceous involucre, and *Pterophyton*, including a part of DeCandolle’s *Verbesinaria* and most of the obscurely distinguished genus *Actinomeris*. From 1883 to 1889, Dr. Klatt (Leopoldina, xx.–xxv.) characterized many species and sought to disentangle the synonymy. In the second volume of Hemsley’s *Biologia*

Cent.-Am. Bot. are enumerated, with synonymy and citation of specimens, 30 named species known to grow in Mexico and Central America. So rapid, however, has been the recent exploration of the regions mentioned that this number is already more than doubled.

The genus is now generally conceded to be exclusively American, except so far as species have been introduced or naturalized in some parts of the Old World. Various obscure gerontogeous plants, early ascribed to *Verbesina* and enumerated in the Index Kewensis, are omitted from the following revision as they are with little doubt generically distinct.

The genus as here presented contains 109 species. More than 70% of these are local, and over 90% are confined to some one of the following regions.

| | |
|--|------------|
| S. E. United States (S. Car. to Fla. and Ala.) . . . | 3 species. |
| Region of the Lower Rio Grande | 2 " |
| Sonoran Region (W. Tex. to L. Calif. and N. W. Mex.) | 16 " |
| Central and S. Mexico | 44 " |
| Central America | 9 " |
| N. South America (U. S. Colombia to Guiana) . . . | 4 " |
| Brazil, Uruguay, Paraguay, Argentine Rep. . . . | 11 " |
| Andean Region (Ecuador to Chili) | 8 " |
| W. Indies | 2 " |

Verbesina, as a whole, reaches its highest specific diversity in the uplands of Central and Southern Mexico, where no less than 40% of its species are endemic. The genus is conveniently divided into 12 sections, of which *Hamulium*, *Platyptera*, *Stenocarpha*, *Alatipes*, *Pterophyton*, *Sonoricola*, *Ximenesia*, and *Pseudomontanoa* are obviously natural groups. Of these *Hamulium*, *Platyptera*, *Stenocarpha*, *Alatipes*, and *Sonoricola* are each composed of species of uniform or contiguous ranges. *Pseudomontanoa*, apparently unrepresented in Central America and W. Indies, is found in Mexico and Caribbean S. America. *Ximenesia* exhibits in the species *V. australis* a new instance of the interesting community of character between the flora of the Rio Grande region and that of extra-tropical S. America.

The sections *Verbesinaria*, *Saubinetia*, *Ochractinia*, and especially *Lipactinia*, must be regarded rather as provisional aggregates than natural or wholly satisfactory groups. In the general arrangement of the sections the sequence is from the large-headed to the small-headed forms. It may be noted that discoid heads occur only in *Platyptera* and

Lipactinia, and that roughly speaking the size of the plant is apt to be inversely proportionate to the size of the heads, i. e. the large-headed species are chiefly herbaceous, the medium-headed species fruticose, and the small-headed fruticose or arborescent, — a rule which, of course, has many exceptions. Annual species are known only in *Hamulium* and *Ximenesia*. The related genus *Actinomeris* is maintained, as by Dr. Gray, for the two typical species, which in their divergent pappus-awns and globose receptacles are sufficiently marked. The genus *Otopappus* cannot be distinguished solely upon the ear-like wing of the achene, but is readily recognized by its more paniculate (less corymbose) inflorescence and opposite oval attenuate undivided leaves, which are 3-5-nerved from near the base.

VERBESINA, L. (name a derivative of *Verbena*, applied because of some resemblance in foliage). — Heads radiate or discoid: ray-flowers when present usually styliferous and fertile but sometimes styliferous and sterile, and sometimes neutral: disk-flowers fertile. Involucre hemispherical or campanulate, sometimes much shorter than the disk-flowers; bracts imbricated in 2 to 6 series, ovate to lance-oblong or linear, seldom squarrose, the outer usually but not always shorter. Receptacle usually conical; pales concave, folded about the outer edge of the laterally compressed disk-achenes, sometimes squarrose in age. Corollas orange-yellow to cream-colored or white; rays short and scarcely exerted or more often long and showy; disk-corollas regular, with short tube, cylindrical throat and 5-toothed limb. Anthers unappendaged at the base. Style-tips acute or attenuate. Achenes glabrous or upwardly pubescent, sometimes tuberculate, strongly compressed laterally, usually oblong or obovate, winged on each edge. Pappus of 2 deciduous or persistent usually straight rarely hooked or obsolete awns. Herbs or shrubs (becoming arborescent in the tropics) with leaves serrate, dentate, or variously lobed, sometimes opposite, sometimes all or partly alternate, often of harsh texture and more or less scabrous, seldom glabrous, often decurrent. Heads small to large, numerous and corymbose to solitary on long terminal peduncles. Wings of the achenes white, chartaceo-cartilaginous. — Syst. Nat. (1735), & Spec. ii. 901, in part; DC. Prodr. v. 612; Benth. & Hook. f. Gen. ii. 379; Baillon, Hist. Pl. viii. 204; Gray, Proc. Am. Acad. xix. 11-15; Klatt, Leopoldina, xx. 92-94, xxiii. 143-144; Hoffmann in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 238. Chief synonyms: *Ancistrophora*, Gray, Mem. Am. Acad. n. ser. vi. 457. *Hamulium*, Cass. Bull. Soc. Philom. 1820, p. 173. *Platypteris*, HBK. Nov. Gen.

& Spec. iv. 200. *Saubinetia*, Remy in Gay, Fl. Chil. iv. 282. *Ximenesia*, Cav. Ic. ii. 60, t. 178. For more complete generic synonymy see Hook. f. & Jacks. Ind. Kew. under *Verbesina* and *Actinomeris*.

§ 1. HAMULIUM, DC. l. c. 617. Awns of the pappus hooked at the summit. Heads subsolitary, radiate; ligules short, yellow, more or less biseriate. — *Hamulium*, Cass. l. c. & Dict. xx. 260. *Ancistrophora*, Gray, l. c. — Two species, chiefly West Indian.

* Acaulescent.

1. V. WRIGHTII, Griseb. Dwarf herb with radical spatulate leaves and naked scapose peduncles. — Cat. Pl. Cub. 155 (1866). *V. ancistrophora*, Gray, Proc. Am. Acad. xix. 14 (1883). *Hamulium Wrightii*, Sch. Bip. Bonplandia, ix. 365 (1861). — Cuba, Wright, no. 1317.

* * Caulescent: leaves alternate, decurrent.

2. V. ALATA, L. Spec. ii. 901. *Hamulium alatum*, Cass. l. c. 261. — Common and generally distributed in the West Indies. Said also to grow in Dutch Guiana and in Mexico, but not obtained in the latter country by recent collectors.

§ 2. PLATYPTERIS, DC. l. c. 617, in part (as to § 1). Heads discoid, large, subglobose. — *Platypterus*, HBK. Nov. Gen. & Spec. iv. 200. — Three species of S. Mexico and Central America with opposite leaves and winged stems.

* Bracts of the involucre of subequal length, the outer obovate or oblanceolate.

3. V. FRASERI, Hemsl. Biol. Cent.-Am. Bot. ii. 187. — Guatemala, Dueñas, *Fraser, Savin, & Godman*, acc. to Hemsl.; Depart. Santa Rosa, *Heyde & Lux*, no. 4236 of Mr. J. Donnell Smith's sets.

Var.* NELSONI, J. Donnell Smith, Bot. Gaz. xxiii. 9. — Near Neuton, Depart. Huehuetenango, Guatemala, *Nelson*, no. 3551. Said to have leaves lobed and heads smaller than in the typical form.

* * Involucral bracts narrow, oblong to linear, the outer much shorter.

+ Leaves ovate, serrulate.

4. V. OVATIFOLIA, Gray in Hemsl. l. c. 189, & Proc. Am. Acad. xix. 15. — Chiapas, Mexico, *Ghiesbreght*, no. 523.

+ + Leaves dentate or sinuately lobed.

5. V. CROCATA, Less. Syn. Comp. 232; DC. Prodr. v. 617; Hemsl. l. c. 187. *V. Fraseri*, Klatt, Bull. Soc. Bot. Belg. xxxi. 205, not Hemsl. *Bidens crocata*, Cav. Ic. i. 66, t. 99. *Spilanthes crocata*,

Sims, Bot. Mag. t. 1627. *Platypteris crocata*, HBK. l. c. 201. — Tepic, Santiago, *Lamb*, no. 548; Jalisco, in ravines near Guadalajara, *Palmer*, no. 700, *Pringle*, nos. 1796, 1807; Morelos, Cuernavaca, *Bourgeau*, no. 1770; between Huajuapam, Oaxaca, and Retlatzingo, Puebla, altitude 1,400 to 2,000 m., *E. W. Nelson*, no. 1991; Costa Rica, *Pittier*, nos. 4136, 4905.

§ 3. STENOCARPHA. Heads of medium size, globose: rays present, inconspicuous. Pales narrowly linear. Achenes papillose. Leaves opposite, sinuate-pinnatifid.

6. V. PLATYPTERA, Sch. Bip. in Klatt. Leopoldina, xxiii. 144 (1887), not Benth. & Hook. f. Gen. ii. 350 (in note), which, although earlier (1873), is a nomen nudum. — Mexico, Puerto de Sta. Cruz, *Liebmann*, no. 454.

§ 4. ALATIPES. Heads large, subglobose: rays present, pale yellow. Peduncles (except sometimes in *V. sphærocephala*) winged. Scales of the involucre ovate or broadly oblong, some or all rounded at the apex (occasionally involute and not showing at once their full breadth).

* Heads numerous, short-peduncled: leaves ovate, serrate, not lobed: wings of the stem narrow or obsolete.

7. V. SPHÆROCEPHALA, Gray. Woody at the base, 1 to 2 m. high. — Gray in Wats. Proc. Am. Acad. xxii. 428 (1887). — Mountains near Guanajuato, *Dugès*, no. 472; Jalisco, on hills near Guadalajara, *Palmer*, no. 448, *Pringle*, no. 1779; Colima at Manzanillo, *Palmer*, no. 1404.

* * Heads few: leaves dentate or lobed: stems and peduncles broadly winged.

— Leaves rhombic-ovate to oblong, dentate but not lobed.

8. V. SCABRA, Benth. Pl. Hartw. 41. This species is reduced by Mr. Hemsley and by Dr. Gray to *V. tetraptera*, but from a drawing by Klatt and Benthams' brief characterization of the involucre we identify with the species Palmer's no. 377, from Tequila, Jalisco, which with its few broad herbaceous involucreal scales is surely distinct from *V. tetraptera*. The type of *V. scabra* was collected by *Hartweg* at Zitacuaro in Eastern Michoacan.

+ + Leaves, at least the lower ones, sinuate-lobed and borne on a distinct though broadly winged petiole.

9. V. KLATTII. *V. heterophylla*, Klatt, Arbeit. Bot. Mus. Hamb. 1892-93, p. 3 of reprint, not Gray. — Mountains near Patzcuaro, Michoacan, *Pringle*, no. 3983 (distrib. as *V. platyptera*?).

§ 5. **PTEROPHYTON**, Gray. Heads large or medium-sized, solitary or very few (rather numerous in *V. ovata*), mostly terminal on long peduncles. Rays present, yellow. Scales of the involucre narrower, oblong (broadly so in *V. Lindheimeri*) to linear. Pappus-awns short or obsolete, never longer than the breadth of the achene. Leaves opposite (except sometimes the uppermost), oblong and sessile or often rhombic-ovate upon cuneately winged petioles. — Proc. Am. Acad. xix. 12, & Syn. Fl. i. pt. 2, 287, in part. *Pterophyton*, Cass. Bull. Soc. Philom. 1818, p. 76, in part. — Herbaceous perennials of the Gulf States and Mexico.

* Peduncles winged to the heads: leaves opposite, rhombic to deltoid.

10. **V. TETRAPTERA**, Gray, Proc. Am. Acad. xix. 13 (1883). *Actinomeris tetraptera*, DC. Prodr. v. 575 (1836); Hemsl. l. c. 186 (excl. syn. *V. scabra*). *Helianthus tetrapterus*, Ort. Dec. vi. 74 (1798). *Coreopsis alata*, Cav. Ic. iii. 30, t. 260 (1794). — Mexico, San Luis Potosi, Parry & Palmer, no. 473½, Schaffner, no. 257; State of Mexico, Bourgeau, no. 604, Pringle, no. 3151; Oaxaca, Conzatti & González, nos. 399, 399*, Coulter, no. 370.

* * Main axis broadly winged up into a compound 12-20-headed corymb: leaves alternate, oblong.

11. **V. PTEROCAULA** [Moc. & Sess.], DC. Prodr. v. 616 (1836); A. DC. Calques des Dess. t. 597. *V. ovata*, Gray, l. c. (1883). *V. tetraptera*, Klatt, Leopoldina, xx. 94, not Gray. *Coreopsis ovata*, Cav. l. c. 41, t. 280 (1794). *Actinomeris ovata*, Nutt. Gen. ii. 181 (1818); Hemsl. l. c. 185. — S. Mexico, Real del Monte, Coulter, no. 363, Ehrenberg, no. 351; Mt. Orizaba, Seaton, no. 340.

* * * Peduncles long and wingless: heads solitary or few: stem winged below (except in *V. Schaffneri*, var. *exalata*).

+ Leaves oblong, green on both sides, sessile.

++ Rays yellow: Mexican.

12. **V. Rosei**. Erect herbaceous perennial, 3 to 6 dm. high, bright green and appearing glabrous, but under a lens strigillose: stems (narrowly or broadly winged up to the highest pair of leaves) 1 or more from a small lignescent stock with tough fibrous roots: leaves (3 to 4 pairs) opposite, oblong to oblong-lanceolate, acute or obtuse, serrulate, 5 to 9 cm. long, 1.5 to 2.5 cm. broad: peduncles 1 to 2, slender, 1-3-headed; bracts linear; pedicels long and slender; heads medium-sized 1 to 1.2 cm. broad exclusive of the rays; involucre scales 1-2-seriate, herbaceous, linear-

oblong, obtusish: ligules about 7, bright yellow, 1.7 cm. long: disk-achenes obovate, upwardly hispidulous; wings very narrow; awns two, short. — Tepic, on foothills between Acaponeta and Pedro Paulo, 2 August, 1897, *Dr. J. N. Rose*, no. 1948, and by the same collector between Pedro Paulo and San Blascito, 4 August, 1897, no. 3343. Types in herb. U. S. Nat. Museum and herb. Gray.

++ ++ Rays nearly white. Florida species.

13. *V. HETEROPHYLLA*, Gray, l. c. 12 (1883), & Syn. Fl. i. pt. 2, 288; Chapm. Fl. S. U. S. ed. 3, 255. *Actinomeris heterophylla*, Chapm. Bot. Gaz. iii. 6. — Low pine barrens, E. Florida, *Chapman, Palmer, Curtiss*, no. 1468^a, *Garber*.

+ + Leaves rhombic or deltoid with cuneate petiolar base.

++ Leaves densely canescent-tomentose beneath.

14. *V. COULTERI*, Gray. Leaves rhombic-oblong, finely toothed; blade not at all hastate or deltoid. — Proc. Am. Acad. xix. 13; Hemsl. l. c. iv. 57. *V. Capitaneja*, Hemsl. l. c. ii. 187, in part, not Nees. — S. Mexico, Zimapan, *Coulter*, nos. 341, 369.

++ ++ Leaves covered with slightly scabrous subappressed pubescence, pale green on both surfaces; blade subhastate or deltoid.

15. *V. Schaffneri*. Erect 1-several-stemmed perennial, slightly ligneous at the base: leaves about 3 pairs, opposite, the blade triangular, coarsely crenate-toothed, acutish or obtuse, contracted below into cuneate broadly winged entire petioles half their length; these decurrent upon the stem in herbaceous wings: peduncles long, terminal, terete, wingless, 1-2-headed; pedicels relatively short: bracts of the involucre 2-3-seriate, oblong, obtuse, canescent-pubescent about the margins: ligules about 12, oblong, deep yellow, 1.8 cm. long: achenes obovate, 7 mm. long, glabrous; body black, lucid; wings of medium breadth, thin, translucent. — Mexico, San Luis Potosi, in sandy ground near the city, September, 1876, *Schaffner*, nos. 258, 301, in part, *Parry & Palmer*, no. 473.

Var. exalata. Winged petioles subauriculate at the base not at all decurrent. — With the type at San Luis Potosi, *Schaffner*, no. 301 in part, also in "North Mexico," *Parry* (1878), no. 26½ in part.

++ ++ ++ Leaves (yellow-green) papillose-scabrous, rhombic-ovate, shallowly serrate-dentate.

16. *V. CAPITANEJA*, Nees, Linnæa, xix. 729 (1847); Hemsl. l. c. 187, in part (only as to pl. Bourgeau). ? *V. crocea*, Klotzsch in Klatt, l. c. 94 (nomen subnudum). *Actinomeris pedunculosa*, DC. Prodr. v.

576. — Valley of Mexico, Santa Fé, *Bourgeau*, no. 377, Tacubaya, *Schaffner*, no. 242; Durango, *E. W. Nelson*, no. 4600, *Palmer*, no. 318 (coll. of 1896).

* * * * Peduncles long and wingless; stems also wingless throughout.

— Species of Mexico and S. W. United States.

++ Leaves chiefly opposite, very obtuse, narrowed to a distinct although winged petiole.

17. *V. LONGIPES*, Hemsl. Biol. Cent.-Am. Bot. ii. 188. — Mexico without locality, *Coulter*, no. 342. To this species we should refer Pringle's no. 3215, collected on rocky hillsides, San José Pass, State of San Luis Potosi, 22 July, 1890.

++ ++ Leaves chiefly alternate, the upper lanceolate, narrowed to an obtuse apex, sessile by a somewhat contracted but auriculate-clasping base: involucre bracts narrowly oblong.

18. *V. Rothrockii*. Stems erect, herbaceous, 6 dm. high, usually simple and 1-headed, terete, puberulent, scabrous, 1 to 4 from a thickish woody stock: leaves oblong-obovate, crenate-dentate from below the middle, green and scabrous-pubescent on both sides, 5 to 8 cm. long, half as broad, amplexicaul by two broad basal auricles: peduncles long, naked, terminal, rarely branched: heads 1.5 to 2 cm. broad exclusive of rays; involucre scales about 2-seriate, not very unequal, oblong, obtuse, hirtellous to strigillose, the inner somewhat erose-dentate: rays 8 to 12, orange-yellow, 1.5 to 2 cm. long: achenes 7 mm. long, broadly winged, glabrous; pappus obsolete. — *V. Wrightii*, Gray, Proc. Am. Acad. xix. 12, in part, & Syn. Fl. i. pt. 2, 287, in part. *Actinomeris Wrightii*, Gray, Pl. Wright, ii. 89, not of Pl. Fendl.; Rothrock in Wheeler, Rep. vi. 162, t. 8; Hemsl. Biol. Cent.-Am. Bot. ii. 186, excl. pl. Texas. — S. Arizona, Camp Bowie, *Dr. J. T. Rothrock*, no. 452, Ojo de Gavilan, *Thurber*, no. 1058, foothills of the Sta. Rita Mts., *Pringle*; Arizona without locality, *Lemmon*; New Mexico, between the Copper Mines and Conde's Camp, *Wright*, no. 1235; Coahuila, *Palmer*, nos. 585, 597, 598.

We take pleasure in dedicating this species to Dr. Rothrock, who (l. c.) first noted differences between this plant and the Texan species to which it has long been referred.

++ ++ ++ Leaves subsessile by a cuneate exauriculate base; the upper oval: involucre bracts broadly oblong.

19. *V. Lindheimeri*. *V. Wrightii*, Gray, Proc. Am. Acad. xix. 12 (1883), in part, & Syn. Fl. i. pt. 2, 287, in part, not Griseb. (1866).

Actinomeris Wrightii, Gray, Pl. Fendl. 85. — Rocky places in woods, W. Texas, *Lindheimer*, nos. 37, 38, 643, *Wright*.

+ + Species of the S. E. United States.

++ Leaves coarsely serrate-dentate : rays very long.

20. V. NUDICAULIS, Gray, Proc. Am. Acad. xix. 12 (1883), & Syn. Fl. i. pt. 2, 288 ; Chapm. Fl. S. U. S. ed. 3, 255. *Helianthus? aristatus*, Ell. Sk. ii. 428. *Actinomeris nudicaulis*, Nutt. Trans. Am. Phil. Soc. vii. 364 ; Torr. & Gray, Fl. ii. 336. — Rich pine woods, Georgia, *Boykin* ; Alabama, *Buckley*, *Donnell Smith* ; Florida, *Chapman*, *Curtiss*, nos. 19, 5910, *Nash*, no. 2202.

++ ++ Leaves remotely serrulate or subentire : rays very short.

21. V. WAREI, Gray, ll. cc. *Actinomeris pauciflora*, Nutt. Am. Jour. Sci. v. 301, & Trans. Am. Phil. Soc. vii. 364. — Low pine barrens, W. Florida, *Ware*, *Chapman*.

§ 6. SONORICOLA. Heads large or medium-sized, seldom numerous : rays yellow, often pale ; scales of the involucre narrowly to broadly oblong ; awns of the pappus long and slender, at least when young much longer than the breadth of the achene : leaves opposite (at least below), ovate (lanceolate in *V. chihuahuensis*), not decurrent along the stem. Stems wingless, often ligneous. Species of the general Sonoran region forming a natural group.

* Body of the mature achenes 6 to 10 mm. long.

+ — Leaves sessile.

22. V. DISSITA, Gray, Proc. Am. Acad. xx. 299. — Lower California, near Todos Santos Bay, *Orcutt*, no. 1233, and La Guilla, no. 1355.

+ + Leaves on broadly winged auriculate-clasping petioles : Lower Californian.

23. V. PALMERI, Wats. Proc. Am. Acad. xxiv. 56 (1889). — Mountain Cañons, Los Angeles Bay, Lower California, *Palmer*, no. 528.

+ + + Leaves on long narrowly winged exauriculate petioles : Mexican.

24. V. LEPTOCHÆTA, Gray, Proc. Am. Acad. xxi. 389 (1886). — S. W. Chihuahua, *Palmer*, no. 170.

* * Body of achenes 4 to 5 mm. long, glabrous ; wings broad, fringed.

25. V. EROSA, Brandege, Proc. Calif. Acad. Sci. ser. 2, iii. 146 (1891). — Sierra de San Francisquito, Lower California, *Brandegee*.

* * * Body of the achenes 3 to 5 mm. long, upwardly pubescent; wings narrower.

+ Bracts of the involucre not very unequal, 2-3-seriate, grayish green: Mexican.

26. *V. CHIHUAHUENSIS*, Gray, l. c. — Limestone ledges, Jimulco, Durango, and Carneros Pass, Coahuila, *Pringle*, nos. 121, 2782, and Sta. Eulalia Mts., Chihuahua, *Pringle*, no. 657; Durango, *Palmer*, no. 322 (coll. of 1896), a form with broader deltoid leaves.

+ + Bracts of the involucre strongly unequal, 4-5-seriate, at length nigrescent: Lower Californian.

29. *V. VENOSA*, Greene, Bull. Torr. Club, ix. 110 (1882). *V. hastata*, Kellogg, acc. to Mrs. Curran, Bull. Calif. Acad. Sci. i. 140 (1885). *Encelia cedrosensis*, Rose, Contrib. U. S. Nat. Herb. i. 17 (achenes too young to show wings). — Cedros Island, off the coast of Lower California. *Palmer*, no. 741, *Anthony*, nos. 63, 296.

§ 7. *XIMENESIA*, Gray. Heads large; involucre bracts narrow, herbaceous, 2-3-seriate, subequal or the outer often more elongated and foliaceous: rays showy, yellow or orange, broad, deeply 3-toothed or -lobed at the apex: mostly annuals, always more or less canescent at least on the under surface of the coarsely toothed petiolate leaves. — Syn. Fl. i. pt. 2, 288. *Ximenesia*, Cav. Ic. ii. 60, t. 178; DC. Prodr. v. 627.

* Pales very narrow, almost filiform, persistent: petioles winged: rays short: apparently perennial.

28. *V. nana*. Dwarf, canescent-pubescent, branched from near the base; branches 1 to 1.5 dm. long, procumbent: leaves chiefly opposite, oval, obtuse or obtusish, irregularly and more often obtusely dentate, 3 to 5 cm. long, nearly half as broad, narrowed below to winged petioles; these entire or bearing two to four spreading teeth near the stem: peduncles solitary, terminal upon the branches: involucre bracts oblong to lance-linear, 8 mm. long, subequal: rays deep orange, seldom over 8 or 10 mm. in length: achenes suborbicular, broadly winged, villous; wings obtuse at the summit; pappus none. — *V. encelioides*, Gray, Syn. Fl. i. pt. 2, 228, in part. *Ximenesia encelioides*, a dwarf form, Gray, Pl. Wright. i. 112. *X. encelioides*, var. *nana*, Gray, Pl. Wright. ii. 92. — S. W. Texas, Laredo, *Berlandier*, nos. 1474, 214, *Wright*, coll. of 1851, Limpia, *Sutton Hayes*, no. 463; Coahuila, La Ventura, *E. W. Nelson*, no. 3918.

There has been an unfortunate confusion in the labelling or mounting of Wright's no. 1407, cited by Dr. Gray as the type of his var. *nana*. The plant mounted with the label no. 1407 (which shows evidences of erasure and change) is *V. encelioides*, var. *cana*, while the plant which Dr. Gray really described is undoubtedly the one here taken as *V. nana*.

* * Pales linear-oblong, entire or 2-3-toothed: annuals.

+ Achenes broadly winged from the summit to the base.

29. *V. ENCELIOIDES*, Benth. & Hook. f. Leaves appressed-pubescent but green above; petioles (at least of the upper leaves) provided on each side with a wing which broadens towards the base into a semi-ovate incised stem-clasping auricle: outer involucre scales long, green, much surpassing the disk: wings of the achene rather broad, acutish at the apex. — Benth. & Hook. f. acc. to Gray, Bot. Calif. i. 350; Gray, Syn. Fl. i. pt. 2, 288, in part. *Ximenesia encelioides*, Cav. l. c.; DC. l. c. — Florida, *Curtiss*, nos. 1503, 5650, *Palmer*, no. 291; Texas, *Heller*, no. 1785; Mexico, San Luis Potosi, *Parry & Palmer*, no. 468, State of Tamaulipas, Victoria, *E. W. Nelson*, no. 4425; Cuba, *Wright*, no. 3611. Naturalized in the warm parts of the Old World and cultivated in a broad-leaved form (*Ximenesia encelioides*, var. *hortensis*, DC. l. c.).

Var. cana. More canescent throughout, even the upper surface of the leaves usually whitish with copious appressed pubescence: involucre bracts shorter, subequal. — *Ximenesia encelioides*, var. δ *cana*, DC. l. c.; Gray, Pl. Wright. ii. 92. — Texas, Laredo, *Berlandier*, nos. 2068, 2074; S. W. Texas, *Wright*, no. 352, *Palmer*, no. 617; New Mexico, *Fendler*, no. 421; Cuba, *Combs*, no. 577; Hawaiian Isls., *Hillebrand*.

Var. exauriculata. Pale green annual: petioles entirely naked and slender or rarely the upper bearing a divaricate usually oblong subentire lobe on each side of the base: scales of the involucre subequal, scarcely or not at all surpassing the disk: wings of the achene broad, corky, obtuse at the apex. — *V. encelioides*, Gray, Syn. Fl. i. pt. 2, 288, in part; Hemsl. l. c. *Ximenesia encelioides*, Rothrock in Wheeler, Rep. vi. 163. — Kansas, *Hitchcock*, no. 277; Colorado, in the Arkansas Valley near Pueblo, *Greene*, Colorado Springs, *Miss Mulford*; Arizona, on the Little Colorado, *Sitgreaves Exp.*, *Thurber*, no. 667, *Rothrock*, no. 772, *Pringle*; Mexico, Coahuila, *Palmer*, no. 2064, Sonora, *Hartman*, no. 229, without locality, *Rose*, no. 3076.

+ + Achenes narrowly winged or only winged near the summit.

30. *V. AUSTRALIS*, Baker in Mart. Fl. Bras. vi. pt. 3, 215. *Ximenesia microptera*, DC. l. c.; Hook. & Arn. in Hook. Jour. Bot. iii. 316; Griseb. Symb. Fl. Argent. 195. *X. australis*, Hook. & Arn. in DC. l. c. vii. 291. — South America, Buenos Ayres, *Bacle*; Concepcion del Uruguay, *Lorentz*; Central Paraguay, *Morong*, no. 98; Bolivian Plateau, *Bang*, no. 1003; also N. E. Mexico at Matamoras, *Berlandier*, no. 2286. From description we cannot separate *V. aurita*, Philippi, Ann. del. Mus. Nat. Chile, Bot. 1891, p. 48.

§ 8. VERBESINARIA, DC. Heads mostly numerous, medium-sized or large; involucre bracts lanceolate to linear-oblong: rays relatively long (1 to 2.5 cm.) and showy, yellow: leaves linear- to lance-oblong, or ovate, alternate (except in *V. hypoglauca*, *V. sororia*, *V. occidentalis*, and *V. elegans*), never lobed. — Prodr. v. 612, in part.

* Leaves narrow, linear to oblong, entire or remotely serrulate.

+ Outer bracts of the involucre of irregular length, some of them elongated and much surpassing the disk: stem wingless: leaves 1 to 2 dm. long.

31. *V. LONGIFOLIA*, Gray, Proc. Am. Acad. xix. 12 (1883), & Syn. Fl. i. pt. 2, 287. *Actinomeris longifolia*, Gray, Pl. Wright. ii. 89; Hemsl. Biol. Cent.-Am. Bot. ii. 185. — Mountains east of Santa Cruz, Sonora, Wright, no. 1234; Arizona, Rothrock, no. 608, Pringle, no. 327, Lemmon; Chihuahua, Pringle, no. 1286.

+ + Outer bracts of the involucre not surpassing the inner nor the disk.

+ + Leaves soft-pubescent or tomentose beneath.

32. *V. hypomalaca*. Erect perennial herb, 4 to 6 dm. high: stems single or several, virgate, simple, terete, pubescent to hirsute, very leafy: leaves narrowly oblong to linear, obtuse or acute, obsoletely crenulate or serrulate (the margins tending to be revolute), 3 to 8 cm. long, 4 to 10 mm. broad, sessile by a cordate-auriculate base, pubescent and very scabrous above, canescent-tomentose beneath: heads 6 to 30, ovate or at length subconical, 1 cm. in diameter excluding the rays, borne on erect pubescent pedicels in a flat-topped corymb: involucre scales about 2-seriate, linear-oblong, obtusish, pubescent: ligules 15, about 1 cm. long. — *V. stricta*, Gray, Proc. Am. Acad. xix. 13, in part, & xxii. 427. *Actinomeris stricta*, Hemsl. l. c. 186, in part. — Orizaba, Botteri, no. 95, Seaton, no. 367; Rio Blanco, Jalisco, Palmer, no. 163; Cerro Ventoso above Pachuca, Hidalgo, Pringle, no. 7611; Coahuila, Palmer, nos. 627, 628; Mexico without locality, Coulter, no. 362.

Var. *hypochlora*. Leaves yellowish green and soft-pubescent rather than tomentose beneath. — Hills of Patzcuaro, Michoacan, Pringle, no. 4136; near Monte Escobedo, Zacatecas, Dr. J. N. Rose, no. 2630. Types in herb. Gray and herb. U. S. Nat. Museum.

+ + Leaves glabrous or covered with a short sparse and scabrous pubescence beneath.

= Stem wingless: rays deep yellow.

33. *V. STRICTA*, Gray, l. c. xix. 13, in part. *Actinomeris stricta*, Hemsl. l. c. as to first name type. — San Luis Potosi, Parry & Palmer,

no. 461, *Schaffner*, no. 343; Durango, *Palmer*, no. 453, *E. W. Nelson*, no. 4564; Chihuahua, *Pringle*, nos. 1151, 1285; near Sta. Teresa, Tepic, *Rose*, no. 3397. This species differs from the preceding in its broader (oblong) less crowded leaves very different in pubescence and tending to be conduplicate along the midnerve. The range is also quite different.

= = Stems narrowly winged: rays pale yellow.

34. V. STENOPHYLLA, Greenm. Proc. Am. Acad. xxxii. 309. — Moist slopes above Cuernavaca, Morelos, altitude 2,000 m., *Pringle*, nos. 6503, 6668.

* * Leaves broader, lanceolate to ovate.

+ Leaves coarsely dentate: Mexican.

++ Leaves, at least in part, decurrent upon the stem.

35. V. COAHUILENSIS, Gray, l. c. 14; Hemsl. l. c. iv. 57. — Coahuila, 9.5 km. east of Saltillo, *Palmer*, nos. 584, 619; Nuevo Leon, mountains about Monterey, *Pringle*, no. 2870.

Var. *viridior*. Lower surface of the leaves green, scabrous-puberulent instead of canescent-tomentose as in the typical form. — Limestone ledges, Carneros Pass, Coahuila, 12 August, 20 September, 1890, *Pringle*, no. 3268. Type in herb. Gray.

++ ++ Leaves sessile and auricled, but never decurrent.

36. V. HYPOLEUCA, Gray, l. c. xv. 37, xix. 13; Hemsl. l. c. ii. 188. — San Luis Potosi, Mexico, *Parry & Palmer*, no. 474, *Schaffner*, no. 300.

+ + Leaves serrate or entire (serrate to coarsely dentate in the S. American *V. subcordata*).

++ Perennial herbs or shrubs, with solitary heads and wingless stems: S. American.

= Achenes narrowly winged.

37*. V. ARNOTTII, Baker, l. c. 215. *V. helianthoides*, Hook. & Arn. in Hook. Jour. Bot. iii. 316, not Michx. *V. Hookerii*, Klatt, l. c. xx. 92. — Paraguay at Asuncion, *Gilbert*, no. 1043: Argentine Republic, Entre Rios, *Tweedie*.

= = Achenes broadly winged.

a. Leaves opposite.

38*. V. ASPILIOIDES, Griseb. Symb. Fl. Argent. 194. — Argentine Republic in Prov. Cordoba.

b. Leaves all alternate.

39*. *V. VIGUIEROIDES*, Baker, l. c. — Paraguay at Caaguasu, *Balsana*, no. 852a.

++ ++ Stems wingless: heads corymbose: South American shrubs.

= Scales of the involucre short, obtuse or obtusish, very unequal: leaves slender-petioled, not at all auricled.

40. *V. GLABRATA*, Hook. & Arn. in Hook. Jour. Bot. iii. 315; Baker l. c. 211. *V. helianthoides*, Gardn. in Hook. Lond. Jour. Bot. vii. 424, acc. to Baker, l. c. — Common in the woods of E. Brazil, *Martius*, no. 821, *Burchell*, no. 4593, *Sello*, nos. 863, 864, 1100, 1101.

= = Scales of the involucre about 2-seriate, not very unequal, obtuse to acute, canescent-tomentulose: wings of the achenes very narrow: petioles very short, narrowly wing-margined and subauriculate at the base or none; leaves canescent-tomentose beneath.

a. Andean.

41. *V. ELEGANS*, HBK. Nov. Gen. & Spec. iv. 204; Klatt, Leopoldina, xx. 93. — Andes of Ecuador, *Humboldt & Bonpland*, *Jameson*, *Couthouy*.

b. E. South American.

42. *V. SUBCORDATA*, DC. Prodr. v. 614 (where described as a shrub); ? Baker l. c. 213 (where described as a perennial herb). ? *V. auriculata*, Hook. & Arn. in Hook. Jour. Bot. iii. 315, not DC. — Uruguay and Argentine Republic.

= = = Scales of the involucre caudate-attenuate, very unequal, gray-villous: leaves sessile, subauriculate at the base.

43. *V. Mandonii*, SCH. Bip. in herb. Grayish-pubescent shrub with terete wingless branches: leaves alternate, ovate-lanceolate to lanceolate, acuminate to attenuate, subentire or repandly few-toothed, finely appressed-pubescent and somewhat scabrous above, soft-pubescent and paler but green beneath, pinnately veined, 6 to 15 cm. long, 1.5 to 3 cm. wide, narrowed (gradually or more abruptly) to a sessile sub-auriculate base; the auricles slightly decurrent and tending to persist upon the stem after the fall of the leaf: corymbs about 12-headed, flat-topped, villous to tomentose; involucre scales 3-4-seriate, linear, acute to attenuate: rays about 14, oblong, light yellow, 1.2 cm. long, 4 mm. wide: achenes of the disk-flowers oblanceolate, attenuate at the base, narrowly and equally winged on both sides above, the wings extending upward on

the two short awns. — Linnæa, xxxiv. 528 (nomen nudum), & Bull. Soc. Bot. France, xii. 79 (nomen nudum); Britton, Bull. Torr. Club, xix. 150 (nomen subnudum); Rusby, Mem. Torr. Club, iii. no. 3, 60 (nomen nudum). — Andes of Bolivia, in woods, La Paz, altitude 2,600 to 3,700 m., January, 1861, *G. Mandon*, no. 57 in herb. Gray; October, 1895, *Rusby*, no. 1721; 1889, *Bang*, no. 4.

++ ++ Stem wingless: leaves opposite at least below: heads corymbose:
Mexican species.

= Leaves large, gray-pubescent beneath: achenes with broad fimbriate wings.

44. V. SORORIA, Gray, Proc. Am. Acad. xv. 37; Hemsl. l. c. 190. — San Luis Potosi, *Parry & Palmer*, no. 466.

= = Leaves smaller, lanceolate, white beneath: achenes very narrowly winged.

45. V. HYPOGLAUCA, Sch. Bip. An attractive shrub, 3 to 5 m. high, with habit of the following species. — Sch. Bip. in Klatt, Leopoldina, xxiii. 144 (1887). — S. Mexico, Cumbre de Acalcingo, *Liebmann*, no. 485; Oaxaca on the Sierra de San Felipe, altitude 3,000 m., *Pringle*, no. 6041.

++ ++ ++ Stem (at least on the upper part of the internode) bearing narrow, soon corky wings: leaves alternate: achenes very narrowly margined: fruticose.
S. Mexican species.

= Leaves whitened beneath by an extremely fine and close pubescence: pedicels short, glabrous.

46. V. NERIIFOLIA, Hemsl. l. c. 188. — Chiapas, *Ghiesbreght*, no. 528, *Nelson*, no. 3466. Type number in herb. Gray.

= = Leaves loosely canescent-tomentose beneath: pedicels longer and more slender, pubescent with spreading hairs.

47. V. OAXACANA, DC. Prodr. v. 614, not Klatt, l. c. xxiii. 144. — Mountains of Oaxaca, *Andrieux*, no. 301, acc. to DC. l. c. To this species may be referred L. C. Smith's nos. 877 and 895, coll. at San Juan del Estado at 1,800 m. altitude.

= = = Leaves slightly paler but green beneath: pedicels puberulent to tomentulose.

48. V. LIEBMANNII, Sch. Bip. in Klatt, l. c. xxiii. 144 (1887). *V. variabilis*, Rob. & Greenm. Proc. Am. Acad. xxvii. 47 (1896). — S. Mexico, Cumbre de Estepa, *Liebmann*, no. 538; mountains of Oaxaca, *E. W. Nelson*, no. 1393, *Pringle*, no. 4918, *Conzatti*, no. 31; and a doubtful specimen from Guerrero, *E. W. Nelson*, no. 2215.

++ ++ ++ ++ ++ Stem mostly provided with narrow or broad herbaceous wings: tall herbaceous species of the United States.

= Wings of the achene very narrow or obsolete: leaves ovate, opposite: heads rather small and few-flowered.

49. *V. OCCIDENTALIS*, Walt. Fl. Car. 213 (1788); Gray, Syn. Fl. i. pt. 2, 287, q. v. for rather extensive synonymy. — Woods, etc., Pennsylvania to Florida “and Illinois” (doubted).

= = Wings of the achene broad: leaves chiefly alternate: heads rather large, numerously flowered: rays long.

50. *V. HELIANTHOIDES*, Michx. Fl. ii. 135; Gray, Syn. Fl. i. pt. 2, 288. *Actinomeris helianthoides*, Nutt. Gen. ii. 181; DC. Prodr. v. 575, vii. 290, incl. formal vars. *Nuttallii* and *Elliottii*. ?*A. oppositifolia*, DC. l. c. vii. 290 (opposite-leaved form). — Open woods, etc., Ohio to Iowa, Georgia, and Texas; common.

§ 9. *SAUBINETIA* (*Saubinetia*, Remy in Gay, Fl. Chil. iv. 284, extended). Heads as in the last or smaller: rays present, yellow (rather pale in *V. boliviana*, of uncertain color in *V. guatemalensis*), short, little exerted: leaves oblong or ovate to lanceolate, not lobed (except sometimes in *V. boliviana*).

* Stem wingless: leaves sessile and biauriculate or borne on winged biauriculate petioles; auricles (narrow and sometimes obscure in *V. oreopola*) herbaceous, continuous with the blade, neither deciduous nor decurrent.

+ Leaves ovate or ovate-lanceolate, narrowed to winged auriculate petioles: S. American.

51. *V. BOLIVIANA*, Klatt, Ann. Naturh. Hofmus. Wien, ix. 361 (1894). *V. Bridgesii*, Rusby, Mem. Torr. Club, iv. 212 (1895). — Andes of Bolivia, *Cuming*, near Cochabamba, *Bang*, no. 974. Rays pale yellow.

+ + Leaves oblong, sessile, more or less auriculate or amplexicaul: Mexican.

++ Leaves green and glabrous beneath.

52. *V. NELSONII*, Rob. & Greenm. Proc. Am. Acad. xxxii. 46. — Mountains of Guerrero between Ayusinapa and Petatlan, altitude 1,500 to 2,100 m., 14 December, 1894, *E. W. Nelson*, no. 2118. Types in herb. Gray and herb. U. S. Nat. Museum.

++ ++ Leaves pubescent to canescent-tomentose beneath.

= Involucral scales lanceolate, acuminate.

53. *V. POTOSINA*, Rob. Proc. Am. Acad. xxvii. 175. — San Luis Potosi, mesas at Hacienda de Angostura, *Pringle*, no. 5113.

= = Involucral scales oblong, obtusish.

a. Rays 7 to 8 mm. long.

54. *V. oreopola*. Shrub with short internodes and pale buff cortex: branchlets pubescent with fine white soft sub-appressed hairs: leaves narrowly lance-oblong, subentire or remotely serrulate, attenuate at the apex, narrowed to a sessile somewhat biauriculate base, green, puberulent, and slightly scabrous above, canescent-tomentose or merely pubescent and scarcely paler beneath, 5 to 15 cm. long, 1 to 2.5 cm. broad: heads (7 to 10 mm. in diameter exclusive of rays) 14 to 20 in a compound flat-topped corymb: rays 10 to 12, oblong, yellow: bracts of the inflorescence linear-oblong, acute; involucral scales oblong, obtusish, soft-pubescent and ciliate; chaff stramineous, abruptly contracted to a straight erect mucro: body of the achene black, puberulent, obovate; wings relatively broad, divergent at the summit; awns of the pappus 2, slender, two thirds as long as the body of the achene. — Collected in mountains about San Luis Potosi, August, 1876, *Schaffner*, no. 344; *Parry & Palmer*, no. 457 (1878). Incorrectly referred to *V. persicifolia* and *V. salicifolia* (= *V. virgata*).

b. Rays broadly oblong, 3-dentate, 3 mm. long.

55. *V. guatemalensis*. Stems striate, wingless, alternately branched, sparingly pubescent: leaves alternate, lance-oblong, acute, subentire, glabrate and bullate above, somewhat paler and canescent with fine close appressed pubescence beneath, 7 to 10 cm. long, 1 to 2 cm. broad, narrowed below to a biauriculate subamplexicaul base, not decurrent upon the stem: inflorescence at first loosely but above fastigiate much-branched, sordid-pubescent: heads numerous, in fruit 7 to 9 mm. in diameter: rays very short, 3-dentate, little exserted, probably yellow: achenes obovate, broadly and equally winged; wings rounded at the apex; body 5 mm. long, tuberculate especially along the prominent midnerve: pappus-awns 2, long, slender, equal. — *V. virginica*, Coulter in Donnell Smith, Enum. Pl. Guat. pt. 4, 88, not L. — Palin, Depart. Amatitlan, Guatemala, altitude 1,100 m., February, 1892, *J. Donnell Smith*, no. 2860.

* * Leaves more or less decurrent upon the stem.

+ Involucral scales narrow, linear: pales villous near the summit.

↔ Leaves sparsely pubescent or at length glabrate beneath: Central American.

56. *V. pallens*, Benth. in Oersted, Vidensk. Meddel. 1852, p. 97; Hemsl. l. c. 189. — Nicaragua, on the western slopes of the volcano El Viejo, *Oersted*.

++ ++ Leaves permanently sordid-tomentose beneath: Bolivian.

57. *V. Soratæ*, SCH. Bip. ined. Branches terete, pubescent, narrowly and irregularly winged by the decurrent bases of the winged petioles: leaves alternate, ovate, acuminate, crenate-serrulate, rugose, scabrous-tomentose above, paler and soft sordid-tomentose beneath, 6 to 10 cm. long, 2.5 to 5 cm. broad, pinnately veined, rather abruptly narrowed to a winged and somewhat crisped petiolar portion (1 to 2.5 cm. long): corymbs much branched; branches and pedicels covered with loose sordid woolly pubescence; involucre campanulate, 7 mm. in diameter: rays about 10, oblong, pale yellow?, 7 mm. long: achenes of the disk-flowers (immature) linear, attenuate below; pappus of 2 unequal slender awns. — Linnæa, xxxiv. 528, & Bull. Soc. Bot. France, xii. 79; Britton, Bull. Torr. Club, xix. 150 (all mere mentions). — Sorata, Bolivia, *Mandon*, no. 55, and in the same locality at 2,400 m. altitude, February, 1886, *Dr. H. H. Rusby*, no. 1722.

+ + Involucral scales obovate-oblong, rounded at the apex: pales villous at the summit: Chilian.

58. *V. SAUBINETIA*, Klatt, l. c. xx. 92. *Saubinetia helianthoides*, Remy in Gay Fl. Chil. iv. 284, t. 49. — Near Coquimbo, Chili.

+ + + Involucral scales broad, ovate: pales glabrous or nearly so.

++ Involucral scales acute: leaves acuminate, tomentulose beneath, alternate.

59. *V. acapulcensis*. Stem tomentulose, partially winged by the cuneate decurrent herbaceous bases of the leaves: leaves alternate, ovate, cuspidate-denticulate, acuminate at each end, green, scabrous, and lepidote above, paler and sordid-tomentulose beneath, 1 to 1.8 dm. long, 2.5 to 7.5 cm. broad, pinnately veined; petioles relatively short, winged; heads 35 to 40, short-pedicelled in a rather dense leafless corymb, subglobose, 1.2 to 1.8 cm. in diameter; involucral bracts 2-seriate, ovate, acute, scarcely herbaceous, somewhat stramineous, striate, ciliate: rays about 10, oblong, scarcely exserted: achenes of the disk-flowers about 4 mm. long, narrowly to rather broadly winged, often tuberculate above; awns subequal. — Vicinity of Acapulco, Mexico, *Dr. Edward Palmer*, no. 162 (coll. of 1894–1895). Type in herb. Gray.

++ ++ Involucral scales obtuse: leaves obtuse, barely puberulent beneath, opposite, the uppermost alternate.

60. *V. xanthochlora*. Herbage yellowish green: stem canescent-puberulent, narrowly winged by the green decurrent bases of the leaves; these mostly opposite, ovate-oblong, obtuse, subentire or denticulate, green and concolorous on both sides, appressed-puberulent under a lens:

heads 1 to 1.5 cm. in diameter, subglobose, very short-pedicelled in a loose leafy corymb; pedicels canescent-tomentose; scales of the involucre herbaceous, suborbicular, obtuse or rounded at the apex, tomentulose: ligules about 10, bright yellow, oblong, little exserted: achenes of the disk-flowers oblanceolate, attenuate below, narrowly winged, 6 mm. long, tipped with 2 (to 3) short subequal awns. — Atlitxco, Puebla, Mexico, *E. W. Nelson*, 25 July to 1 August, 1893, without number. Type in herb. Gray and herb. U. S. Nat. Museum.

* * * Leaves (silky-tomentose beneath) not decurrent, but stem with herbaceous wings.

61. *V. MOLLIS*, HBK. Nov. Gen. & Spec. iv. 203; DC. Prodr. v. 617; Hemsl. l. c. 188; Klatt, l. c. xx. 94 (where identity of *V. sericea* is suggested). *V. sericea*, Kunth & Bouché, Ind. Sem. Hort. Berol. 1848, 14; Walp. Ann. ii. 867; Hemsl. l. c. 190. — S. Mexico, originally coll. between Guanajuato and Villalpando by *Humboldt & Bonpland*, mountains of Oaxaca, *Galeotti*, no. 2002, *Pringle*, no. 4863, *E. W. Nelson*, no. 1782, *Conzatti & González*, no. 400.

* * * * Leaves tomentulose beneath, bearing at the base of the short petiole one or two small thickish auricles which soon become corky and fall off: stem wingless: tips of the pales straight.

62. *V. ONCOPHORA*, Robinson & Seaton, Proc. Am. Acad. xxviii. 109. *V. virgata*, var.? *conyzoides*, DC. Prodr. v. 616; A. DC. Calques des Dess. t. 596. *V. conyzoides*, [Moc. & Sess. acc. to] DC. l. c. (1837), not Trew (1769). — State of Mexico, *Bourgeau*, no. 967, *Pringle*, no. 4310.

* * * * Leaves smoothish beneath: stem usually provided with narrow soon corky wings or ridges more or less decurrent from the short petioles: tips of the pales recurved.

63. *V. VIRGATA*, Cav. Shrub 1 to 3 m. high. — Ic. iii. 38, t. 275. *V. salicifolia*, HBK. l. c. 205, although described as herbaceous, is with scarcely a doubt a synonym, as suggested by Hemsl. Biol. Cent.-Am. Bot. ii. 190. *V. persicifolia*, Klatt, Leopoldina, xx. 93, not DC. — Valley of Mexico, *Bourgeau*, no. 963, *Schmitz*, no. 52, *Schaffner*, no. 6; mountains of Oaxaca, *Pringle*, no. 4946, *E. W. Nelson*, no. 1380, *Conzatti*, no. 714; near Plateado, Zacatecas, *Rose*, no. 2753.

* * * * * Leaves not auricled at the base: stem not winged.

+ Leaves opposite, coarsely dentate.

64. *V. SERRATA*, Cav. Leaves ovate, finely pubescent above, cinereous-pubescent beneath: pales shorter than or not greatly exceeding the

achenes. — Ic. iii. 7, t. 214; DC. l. c. 613; Hemsl. l. c. 190; Klatt, l. c. 92, but "angustissime alatis" can apply only to the very young achenes. — Mexico, Guanajuato, *Humboldt & Bonpland*, *Dugès*, no. 469; Aguas Calientes, *Hartweg*, no. 115; Michoacan, *Pringle*, no. 4114; Hidalgo, *Pringle*, no. 6537; Monte de San Juan del Rio, *Berlandier*, no. 1289.

Var. Pringlei. Leaves ovate-oblong, coarsely and irregularly serrate, papillose-scabrous above, pubescent and subcinereous beneath: pales long, recurved, considerably exceeding the mature achenes. — *V. Pringlei*, Robinson, Proc. Am. Acad. xxvii. 175. — Barrancas near Guadalajara, Jalisco, *Pringle*, no. 3845.

Var. amphichlora. Leaves lance-ovate, finely appressed-pubescent and bright green upon both surfaces. — Collected between Ramos and Inde, Durango, Mexico, *E. W. Nelson*, 11–14 August, 1898, no. 4680. Types in herb. Gray and herb. U. S. Nat. Museum.

+ + Leaves opposite, serrulate.

+ + Leaves green and sparingly pubescent beneath: involucre scales obtuse.

65. *V. RESINOSA*, Klatt, Leopoldina, xxiii. 144. — S. Mexico, Yavesia, *Liebmann*, no. 331. Type in herb. Bot. Gard. Copenhagen; fragments and a good sketch in herb. Gray.

+ + Leaves pale, tomentulose, and prominently reticulated beneath: involucre scales acute.

66. *V. GRAYI*, Benth. & Hook. f. acc. to Hemsl. l. c. 188. *Zexmenia Grayii*, Sch. Bip. in Seem. Bot. Herald, 305. — North Mexico, Sierra Madre, *Seemann*, no. 2004.

+ + + Leaves canescent-tomentose beneath without prominent reticulation: involucre scales acute to acuminate.

67. *V. molinaria*. Branches terete, canescent with an almost microscopic appressed pubescence: leaves opposite, oblong-lanceolate, acuminate at each end, serrulate, pinnately veined, pale green and slightly scabrous-puberulent above, canescent and silky-tomentose beneath, 1.2 to 1.4 dm. long, 3 to 3.7 cm. broad; petioles 7 mm. long: heads corymbose, 8 to 10 mm. in diameter; involucre scales about 2-seriate, oblong, acute: rays about 6, oblong, yellow, 4 mm. long, half as broad; the tubular portion pubescent: pales oblong, subtruncate, apiculate: achenes of the disk-flowers 2 to 3 mm. long, puberulent, moderately winged on both edges: pappus of two short awns. — *V. oncophora*? Greenm. Proc. Am. Acad. xxxii. 309. — Under bluffs of a barranca above Cuernavaca, Morelos, altitude 2,000 m., 1 November, 1896, *C. G. Pringle*, no. 6600. The specific name is suggested by its dusty appearance. Type in herb. Gray.

+ + + Leaves alternate or scattered.

+ + Fruiting heads about 1 to 1.5 cm. in diameter.

= Leaves not lepidote above.

a. Scales of the involucre 8 to 10 mm. long: achene with a single small earlike wing in the manner of *Otopappus*, or with two very unequal wings: Mexican.

68. *V. Robinsonii*, FERNALD in herb. *Otopappus alternifolius*, Robinson, Proc. Am. Acad. xxvi. 165 (1891); *O. Robinsonii*, Klatt, Ann. Naturh. Hofmus. Wien, ix. 362 (1894).— Limestone hills, San José Pass, San Luis Potosi, *Pringle*, no. 3310. While this species possesses the typical pappus of *Otopappus*, its habit, and as we now believe its genetic relationship, are nearer to *Verbesina*. The original specific name, *alternifolius*, being preoccupied under *Verbesina*, the species is transferred under the next name. To this species may be referred, with some doubt, *V. Humboldtii*, Klatt, Leopoldina, xx. 92 (as to pl. Mex.), not Spreng. *V. Humboldtii*, Spreng. (*V. helianthoides*, HBK. Nov. Gen. & Spec. iv. 204), is supposed to be Ecuadorian and is described by Kunth as having leaves glabrous above, which is not the case here.

b. Scales of the involucre about 1 cm. long: Bolivian.

69. *V. CINEREA*, Rusby, Mem. Torr. Club, vi. 63. — Near Cochabamba, Bolivia, *Bang*, no. 1092.

c. Scales of the involucre about 7 mm. long: E. South American.

70. *V. SORDESCENS*, DC. Prodr. v. 613; Baker in Mart. Fl. Bras. vi. pt. 3, 214, and var. *semiserrata* (= *V. semiserrata*, Sch. Bip. in herb. acc. to) Baker, l. c. — Brazil, *Riedel*, and others; Central Paraguay, *Morong*, no. 628a.

d. Scales of the involucre 4 to 6 mm. long: wings of the achenes usually subequal: leaves serrate or serrulate: Mexican.

1. Leaves green and closely appressed-puberulent (not scabrous) beneath.

71. *V. chiapensis*. Branchlets striate, appressed-puberulent, at length glabrate and smooth; internodes rather long: leaves lance-oblong, mucronulate-serrulate, attenuate at each end, subglabrous above, scarcely paler and finely appressed-puberulent beneath, pinnately veined, becoming 2 dm. long, 6 cm. broad: corymb 20–30-headed, 1.5 dm. broad; heads 1.2 cm. in diameter excluding the linear-oblong spreading deep yellow rays (8 mm. in length); pedicels slender, 1 to 4 cm. long, covered with short but copious somewhat spreading pubescence; scales of the involucre sub-uniseriate, ovate-oblong, acutish, 3 to 4 mm. long, much

exceeded by the flowers of the at length subglobose disk: achenes (young) obovate, 2 mm. long, puberulent; wings equal but ear-like, confined to the upper part of the achene and more or less adnate to the two pappus awns, these nearly as long as the body of the achene. — Chiapas, Mexico. near Tumbala, altitude 1,200 to 1,700 m., *E. W. Nelson*, no. 3364. Types in herb. Gray and herb. U. S. Nat. Museum.

2. Leaves grayish-tomentulose (not scabrous) beneath: pedicels slender: Mexican.

72. *V. cinerascens*. Branches downy with soft spreading pubescence, terete, pithy: leaves alternate, lance-oblong, attenuate at both ends, remotely serrate, puberulent and scabrous above, grayish-tomentulose beneath, pinnately veined, 1 to 1.3 dm. long, 3 cm. broad: corymbs compound, fastigiate, about 40-headed; pedicels tomentulose, 3 cm. long, erect, the middle one abbreviated; ovate-oblong involucre scales acutish, pubescent, 4 mm. long: flowers pale yellow: rays about 10, narrowly oblong, 8 mm. in length: achenes of the disk-flowers narrowly and somewhat unequally winged; the body 2.5 mm. long, upwardly puberulent. — On cool wooded slopes of a barranca near Guadalajara, Jalisco, 20 November, 1888, *C. G. Pringle*, no. 1806 (distributed as *V. salicifolia*). Type in herb. Gray.

3. Leaves tomentulose at least on the veins beneath, green and at length decidedly scabrous on both surfaces: scales of involucre broadly ovate; pedicels short and thick.

73. *V. crassipes*. Shrub with terete wingless dark purple scabrous-tomentulose branches: leaves alternate, obovate-lanceolate, serrate, acute, sessile by a cuneate neither auriculate nor decurrent base, papillose and very scabrous above, green, tomentulose (at least on the nerves and pinnate veins) and at length scabrous beneath, 6 to 9 cm. long, a third as broad, the margins tending to be revolute: corymbs dense, many-headed; pedicels thick, mostly very short: fruiting heads depressed-globose, 1.5 cm. in diameter: involucre scales ovate-oblong to obovate, finely appressed-pubescent, the outer obtuse, thickened below, the inner acute, somewhat stramineous; pales broad, ovate, acute, stramineous, somewhat ciliate above: rays about 10, linear-oblong, 8 to 9 mm. long: achenes of the disk-flowers, 3 to 4 mm. long, oblong, narrowly and subequally winged; awns 2, slender, subequal. — Oaxaca, Cañada Sta. Maria, 8 December, 1895, *C. & E. Seler*, no. 1476, also by the same collectors in the district of Nochistlan, 14 December, 1895, no. 1590. Types in herb. Gray and herb. Berlin Museum.

4. Leaves white and silvery beneath with appressed microscopic hairs.

74. *V. hypargyrea*. Shrub or tree with leafy, at first cinereous-puberulent, at length glabrate and warty branches: leaves (smaller than in the related species) lanceolate, attenuate at each end, serrate, conspicuously discolorous, green and microscopically puberulent above, silvery-white beneath, pinnately veined, with somewhat prominent reticulation beneath, 8 to 11 cm. long, 1.5 to 2 cm. broad: heads subglobose, numerous, in compound corymbs; pedicels cinereous-puberulent, 6 to 12 mm. long; pales stramineous, tipped by an erect mucro: achenes of the disk-flowers 2 mm. long, glabrous, narrowly and about equally winged, the wings continuous upon the subequal pappus-awns. — Chiapas, between Hacienda Juncana and San Vicente, altitude 1,300 to 1,800 m., 12 December, 1895, *E. W. Nelson*, no. 3510.

e. Inner scales of the involucre about 5 mm. long: leaves coarsely dentate:
S. American.

75. *V.?* *DENTATA*, HBK. Nov. Gen. & Spec. iv. 205. *Pallasia dentata*, H. & B. Pl. Æq. ii. 101, t. 111. — Ecuador, between Penipe and Rio Bamba, *Humboldt & Bonpland*; Ecuadorian Andes, *Spruce*, no. 5792. The achenes of this species seem to be somewhat 4-angled, and the pappus-awns are very unequal.

= = Leaves (at least in age) distinctly lepidote-maculate above with round white dots (bases of fallen trichomes).

a. Lower surface of the leaves sordid-pubescent: involucre campanulate: wings of the achene broad, equal.

76. *V. DONNELL-SMITHII*, Coulter, Bot. Gaz. xx. 50, & in Donnell Smith, Enum. Pl. Guat. pt. 4, 88. *Encelia pleistocephala*, J. Donnell Smith, Bot. Gaz. xiii. 189, & Enum. Pl. Guat. pt. 1, 22. — Guatemala, Coban, Depart. Alta Verapaz, altitude 1,300 m., *von Tuerckheim*, no. 1121 of Mr. J. Donnell Smith's sets; San Miguel Uspantán, Depart. Quiché, altitude 1,800 m., *Heyde & Lux*, no. 3385 of Mr. J. Donnell Smith's sets. Type number in herb. Gray.

b. Lower surface of the leaves essentially glabrous from the first: involucre soon saucer-shaped or reflexed.

77. *V. PERSICIFOLIA*, DC. l. c. 614; Gray, Proc. Am. Acad. v. 183 (*persicæfolia*); Hemsl. l. c. 189; ? Klatt, l. c. xxiii. 144, but not of Klatt, l. c. xx. 93, which is *V. virgata*, Cav. — Between Santander and Victoria, N. E. Mexico, *Berlandier*, nos. 2209, 789, San Luis Potosi, *Pringle*, no. 3078; Wartenberg, Huasteca, *Ervendberg*, nos. 84, 91.

- c. Lower surface of the leaves sordid-pubescent on the veins beneath: involucre saucer-shaped or at length reflexed by the enlargement of the globose head: W. Indian.

78. *V. LEPROSA*, Klatt, Leopoldina, xx. 93. — Morne Rouge, Martinique, *Hahn*, no. 1214.

- d. Lower surface of the leaves tawny-tomentose: involucre as in the preceding: wings of the achenes variable in the same head and often very unequal and adnate to the pappus-awn in manner of *Otopappus*: Mexican.

79. *V. OLIVACEA*, Klatt, l. c. 93. *V. oaxacana*, Klatt, l. c. xxiii. 144, not DC. *Otopappus olivaceus*, and *O. oaxacanus*, Klatt, Ann. Naturh. Hofmus. Wien, ix. 362. — S. Mexico, Hacienda de la Laguna, *Schiede*, no. 340; Mirador, at Consaquitla, *Liebmann*, no. 540 (*V. leprosa*, Klatt, Leopoldina, xxiii. 143, not l. c. xx. 93; also the undescribed *V. Sartorii*, Sch. Bip. acc. to Klatt, l. c. xxiii. 143), and at Trapiche de la Concepcion, *Liebmann*, no. 543 (by clerical error cited as no. 614 by Klatt, l. c.).

++ ++ Heads somewhat smaller, in fruit 7 to 9 mm. in diameter.

= Tips of the pales recurved.

80. *V. SEEMANNII*, Sch. Bip. in Seem. Bot. Herald, 306; Hemsl. l. c. 190. — N. W. Mexico, Sierra Madre, *Seemann*, no. 2027 (with well developed pappus); S. W. Chihuahua, *Palmer*, no. 324 (with pappus reduced).

= = Tips of the pales straight.

- a. Heads 14 to 25 in a rather small corymb often surpassed by the leaves: cortex of the branches gray, soon glabrate: pedicels tomentose with spreading hairs.

81. *V. ABSCONDITA*, Klatt, Leopoldina, xx. 93. — Mexico, without locality, *Ehrenberg*, no. 837. Although characterized as being an herb and as having 5-piloso-costate achenes, this species proves (from a detailed drawing by Klatt) to be the plant formerly described by us as *V. Smithii*, Proc. Am. Acad. xxxii. 46, and its range may be more definitely given as follows: Jaycatlan, Oaxaca, altitude 1,300 m., *L. C. Smith*, no. 132; limestone ledges, near Tehuacan, Puebla, *Pringle*, no. 7497.

- b. Branches not lanate: heads very numerous in broad corymbs; pedicels silky-canescens with subappressed hairs.

82. *V. PERYMENIOIDES*, Sch. Bip. in Klatt, l. c. xxiii. 143. — S. Mexico, Yavesia, *Liebmann*, no. 330; Oaxaca, *C. & E. Seler*, no. 33, *Pringle*, no. 4804; *L. C. Smith*, nos. 216, 295, 898 (smoothish form); *E. W. Nelson*, no. 1507.

c. Heads numerous: branches lanate.

1. Tips of the involucre scales squarrose: rays 7 to 8 mm. long: leaves remotely incurved-dentate, 3 to 5 cm. broad.

83. *V. OERSTEDIANA*, Benth. in Oersted, Vidensk. Meddel. 1852, p. 96; Klatt, l. c. xxiii. 144. — Costa Rica, on the side of the Volcano Irasu, altitude 2,000 to 2,500 m., *Oersted*, *Pittier*, no. 11583.

2. Tips of the involucre scales appressed: rays 1.1 cm. long: leaves essentially entire, 6 to 10 cm. broad.

84. *V. lanata*. Stem stout, pithy, terete, woolly: leaves elliptic-lanceolate, obsoletely denticulate, pubescent upon both surfaces, 1.5 to 2.5 dm. long, 6 to 10 cm. broad, rather abruptly narrowed to a caudate acumination at the apex, gradually narrowed below to a wingless woolly petiole 4 cm. in length: branches of the compound flat-topped many-headed corymbs sordid-lanate or -tomentose; involucre turbinate, about 4-seriate, sordid-tomentulose; scales oblong, obtusish: rays about 10, elliptic-oblong, 6 mm. long, white(?); awns of the pappus long and slender. — *V. Oerstediana*, Donnell Smith, Enum. Pl. Guat. pt. 1, 23, not Benth. — Guatemala, Coban, Depart. Alta Verapaz, *H. von Tuerckheim*, February, 1888, no. 1344 of Mr. J. Donnell Smith's sets.

§ 10. *PSEUDOMONTANOA*. Heads small: rays yellow: leaves sinuately 3-5-lobed: pales broad.

* Leaves alternate.

85. *V. fastigiata*. Tomentulose, younger parts more or less white-woolly: stems with rather broad herbaceous wings: leaves alternate, palmately 3-lobed, slightly scabrous above, loosely canescent-tomentose beneath, 3-nerved from above the base, 8 to 20 cm. long, 5 to 14 cm. broad, decurrent into winged petioles; nerves prominent beneath: heads numerous, in anthesis 5 mm. in diameter, in fruit 1 to 1.2 cm. in diameter, subglobose, in compound flat-topped fastigiate corymbs; scales of the involucre about 3-seriate, unequal, narrowly ovate, acute, appressed-pubescent and ciliate; pales stramineous, acute, with an erect tip: rays small, pale yellow: achenes broadly winged, pale in color, broadly obovate, the body 3 mm. long; pappus of 2 unequal awns. — Mexico, without locality, *Dr. J. Gregg*, 1848-1849, no. 575.

* * Leaves opposite.

+ Stems broadly winged: outer involucre bracts minute, ovate, acute, somewhat decurrent upon the puberulent pedicels; these subumbellate, 1 to 3 cm. long: Mexican.

86. *V. PINNATIFIDA*, Cav. Ic. i. 67, t. 100; DC. Prodr. v. 615; Hemsl. l. c. ii. 190, excl. synonym. and pl. *Oersted*. — Cuernavaca, More-

los, *Bourgeau*, no. 1210; near Guadalajara, Jalisco, *Palmer*, no. 698, *Pringle*, no. 1797; Sinaloa, *Lamb*, no. 463, immature.

+ + Stems narrowly winged: outer bracts of the involucre two thirds as long as the inner, oblong, obtuse; pedicels tomentose, 2 to 8 mm. long: Mexican.

87. *V. montanoifolia*. Stems terete, narrowly 4-winged; internodes long: leaves opposite, sinuately and pinnately 3(-5)-lobed, 8 to 16 cm. long, 8 to 13 cm. broad, scabrous above, green and densely pubescent beneath with short stiff spreading hairs; lobes ovate, denticulate not incised: corymbs compound, the primary branches long, but the ultimate tomentose pedicels considerably shorter than in the preceding species: involucre scales 2-seriate, green, 4 to 6 mm. long: rays 8 to 10, bright yellow, 6 mm. long: body of the disk-achene oblanceolate, 4 mm. long, glabrous; wings about equal, rather broad, rounded at the summit; awns 2, long, subequal. — Ravines, Patzcuaro, Michoacan, 11 November, 1890, *C. G. Pringle*, no. 3475.

+ + + Stems with rather narrow wings: pedicels 4 to rarely 16 mm. long, covered with a sordid pubescence: S. American.

83. *V. caracasana*. Shrub 2 to 3 m. high: branches sparingly scabrous-pubescent; wings 4, herbaceous, 1 to 2 mm. in breadth, straight (not crisped as in *V. pinnatifida*): leaves opposite, sinuately 3-lobed, very scabrous and white-punctate above, somewhat paler but green and sordid-pubescent beneath, rather thin, 8 to 16 cm. long, 6 to 11 cm. broad: lobes acute or acuminate, mucronulate-serrulate to dentate, neither lobed nor incised: corymbs ample, at first fastigiate, at length loose: pedicels slender, more or less flexuous, sordid-pubescent; involucre in anthesis cylindrical, 5 mm. in breadth; scales 3-4-seriate, narrowly oblong, acutish, pubescent: rays 6 to 8, little exserted: fruiting heads 1.5 cm. in diameter: achenes broadly obcordate; the body oblong, cuneate at the base, 4 mm. long, somewhat tuberculate; wings broad; awns 2, nearly as long as the achene. — Caracas, *Birschel*, December, 1854; also near Tovar, Venezuela, 1854-1855, at 1,200 m. altitude, *A. Fendler*, no. 693.

+ + + Stems wingless: Mexican.

89. *V. TRILOBATA*, Rob. & Greenm. Proc. Am. Acad. xxxii. 46. — Rocky gulches, Monte Alban, Oaxaca, *Pringle*, no. 4875.

§ 11. OCHRACTINIA. Heads small: rays white or nearly so: leaves alternate.

* Herbs of the United States, Mexico, and Fernando do Noronha.

+ Wings of the stem 4 to 5, narrow, seldom attaining the inflorescence: pappus well developed.

90. *V. VIRGINICA*, L. Spec. ii. 901; DC. Prodr. v. 616. *V. polyccephala*, DC. l. c. — Highly variable as to foliage, but without significant or constant technical differences.

a (typical form). Leaves undulate-dentate to entire, not lobed, soft-pubescent beneath: rays about 6 mm. long. — Illinois to Georgia and Texas, common. Ervendberg's no. 58 from Huasteca, S. Mexico, is placed here with doubt.

Var. *β* *LACINIATA*, Gray. Leaves sinuately lobed: rays as in the typical form. — Syn. Fl. i. pt. 2, 287. *V. laciniata*, Nutt. Gen. ii. 170. *V. sinuata*, Ell. Sk. ii. 411; DC. l. c. 615. — S. Carolina, *Dr. Mellichamp*, to Florida, near the coast.

Var. *γ* *insularis*. Leaves lobed or undivided: rays short, 3 to 4 mm. long, otherwise closely like the typical form. — Fernando do Noronha, *Ridley, Lea, & Romage*, 1887. Type in herb. Gray.

+ + Wings of the stem commonly 6, usually penetrating the inflorescence: leaves mostly sinuate-dentate or deeply crenate: pubescence very short: pappus well developed, half to two thirds as long as the achene: S. W. United States and adj. Mexico.

91. *V. MICROPTERA*, DC. l. c. 616. — Between Laredo and Bejar, *Berlandier*, nos. 182, 1442; on the Rio Grande near Blancos, *Schott*; Guadelupe, *Palmer*, no. 732 (coll. of 1880); Nuevo Leon, *Berlandier*, June, 1844; Matamoras, *Gregg*.

Var. *mollissima*. Leaves velvety with dense somewhat tawny tomentum beneath. — Valley near Monterey, Nuevo Leon, 7 July, 1888, *C. G. Pringle*, no. 1916, also in Nuevo Leon, *Berlandier*, June, 1843, and on the Rio Coleta, Texas, September, 1850, *G. Thurber*, no. 8.

+ + + Wings of the stem 5 or 6: pappus abortive, scarcely exceeding the narrow wing: outer involucre scales spatulate with an herbaceous tip.

92. *V. rumicifolia*. Stems thick, herbaceous, pithy, finely pubescent, broadly 5(-6?)-winged: leaves alternate, elliptic-lanceolate, large, 1.5 to 2 dm. long, 4 to 8 cm. broad, sharply and doubly sinuate-dentate, acute, narrowed below to a sessile and decurrent base, thin, green and sparsely pubescent on both surfaces; the upper leaves subentire, oblong, elongated, obtuse, crisped on the margins: branches of the corymbose panicle winged; pedicels sordid-villous; heads larger and more numerous than in *V. virginica*; involucre scales canescent-villous,

the outer somewhat spatulate with herbaceous often recurved tips: achenes obovate, glabrous, black and shining, 5 mm. in length, narrowly winged; awns of the pappus very short (0.2 to 0.5 mm. in length). — *V. virginica*, var. *Palmeri*, Gray, acc. to Wats. Proc. Am. Acad. xviii. 106, & xix. 11 (where first described); Hemsl. l. c. iv. 57. — Soledad, Coahuila, Mexico, *Dr. Edw. Palmer*, no. 733 (coll. of 1880). Type in herb. Gray.

* * Trees, shrubs, and gigantic half-shrubs of South Mexico, Central and South America.

+ Leaves broadly lanceolate, very large (7 to 22 cm. in breadth), undivided.

93. *V. punctata*. Stems pale gray, pithy, terete, smooth: leaves alternate, ovate to ovate-lanceolate; the blade 2 to 3 dm. long, 7 to 22 cm. broad, serrate-dentate, slightly scabrous and white-punctate above, green, scarcely paler, veiny and sparsely pubescent beneath, acute, narrowed or abruptly contracted below into a winged petiole: branches of the compound many-headed corymb winged; pedicels filiform, 8 to 14 mm. long; involucre campanulate, 5 to 6 mm. in diameter; scales 3-seriate, ovate, acuminate, ciliolate, otherwise glabrous, the outer much shorter: rays about 8, white, short-oblong: achenes of the disk-flowers (immature) narrowly winged; pappus-awns long and slender. — *V. leprosa*, Coulter in Donnell Smith, Enum. Pl. Guat. pt. 4, 88, not Klatt. — Guatemala, Casillas, and Las Viñas, Depart. Sta. Rosa, *Heyde & Lux*, nos. 4241 and 6176 of Mr. J. Donnell Smith's sets.

+ + Leaves lance-oblong, undivided, 2 to 4 cm. broad, glabrate and very smooth above.

94. *V. ACUMINATA*, DC. l. c. 614. Shrub or small tree, 2 to 5 m. high, exuding a viscid milky juice: leaves varying from entire to serrate. — *V. Moritziana*, Sch. Bip. acc. to Klatt, Leopoldina, xx. 93. *V. salicifolia*, Klatt, l. c. not HBK. — Caracas, *Vargas*, *Moritz*, no. 832; Tovar, Venezuela, *Fendler*, no. 2352; U. S. Colombia, *Moritz*, no. 833.

+ + + Leaves sinuate-lobed or -pinnatifid occasionally subentire in *V. verbascifolia*.

→ Stems wingless above, soon glabrate and very smooth: leaves deeply pinnatifid, lobes 5 to 11, relatively narrow.

95. *V. GIGANTEA*, Jacq. Branches wingless. — Ic. Pl. Rar. i. t. 175 & Coll. i. 53; DC. l. c. 615. *V. myriocephala*, Sch. Bip. in Klatt, l. c. xxiii. 144. — Chiapas, near Yajalon, *E. W. Nelson*, no. 3423; St. Augustine, S. Mexico, *Liebmann*, no. 271; Guatemala, Palin and St. Luis, *J. Donnell Smith*, nos. 2861, 2378; Panama, *Seemann*; Jamaica, *Wolf*; Martinique, *Hahn*; Magdalena, U. S. Colombia, *André*, no. 222.

++ ++ Stems winged even to the inflorescence.

= Leaves deeply 9-13-lobed; lobes oblong, acuminate, not very unequal, serrulate.

96. *V. PINNATA*, Clark acc. to DC. l. c. — Country unknown. Ghiesbreght's no. 782 from Chiapas, Mexico, corresponds well with the description as to foliage, winged stem, etc., but has the stem glabrate as in *V. gigantea*, of which it is probably only a winged form.

= = Leaves deeply 3-9-lobed; lobes oblong, acuminate, not very unequal, serrulate.

97. *V. DIVERSIFOLIA*, DC. l. c.; Baker in Mart. Fl. Bras. vi. pt. 3, 213, t. 65. ? Britton, Bull. Torr. Club, xix. 150. — Bahia, Brazil, *Blanchet & Salzmann*; and probably Coripati, Yungas, Bolivia, *Bang*, no. 2135 (stem winged?). A portion of the type material in herb. Gray. Leaves said to vary to an unlobed form.

= = = Leaves irregularly and seldom deeply lobed, rarely undivided; lobes broad, often obtuse; veins at length very prominent beneath.

98. *V. TURBACENSIS*, HBK. l. c. iv. 203; DC. l. c.; Klatt, Leopoldina, xx. 93. *V. verbascifolia*, Walp. Bot. Zeit. ix. 63 (wrongly referred to the opposite leaved *V. pinnatifida* by Klatt, l. c.). *V. nicaraguensis* & *V. microcephala*, Benth. in Oersted, Vidensk. Meddel. 1852, p. 97-98; Klatt, Bull. Soc. Bot. Belg. xxxi. 206. *V. pinnatifida*, Hemsl. l. c. 190, in part. — S. Mexico, Oaxaca, *Pringle*, no. 4966, *L. C. Smith*, no. 288, *E. W. Nelson*, no. 1852; Lobani, *Liebmann*, no. 333; Orizaba, *Bourgeau*, no. 3208, *Schaffner*; Costa Rica, *Tonduz*, no. 7247; Guatemala, *von Tuerckheim*, no. 1351 of Mr. J. Donnell Smith's sets; Turbaco, U. S. Colombia, *Humboldt & Bonpland*; Tovar, Venezuela, *Fendler*, no. 698; Caracas, *Moritz*, no. 60 (leaves undivided). This species was originally described as having yellow flowers, but this is probably an error. The otherwise excellent description of Kunth and a detailed drawing by Klatt are well matched by the white-flowered plants placed here.

++ ++ ++ Stems wingless, permanently pubescent or tomentose.

99. *V. SUBLOBATA*, Benth. Pl. Hartw. 76; Hemsl. l. c. 190; Klatt, Leopoldina, xxiii. 144. *V. gigantea*, Coulter in Donnell Smith, Enum. Pl. Guat. pt. 4, 88, not Jacq. — Chiapas, *E. W. Nelson*, no. 3468; Guatemala, *Hartweg*, no. 536, *Salvin* (acc. to Hemsl.), *Heyde & Lux*, no. 4238 of Mr. J. Donnell Smith's sets; "Costa Rica & Guatemala," *Warscewicz*, no. 127. *V. tomentosa*, DC. l. c. 614, is a doubtful synonym.

§ 12. LIPACTINIA. Rays none: heads small.

* Leaves (at least in great part) opposite.

+ Erect shrub: leaves serrate, pubescent: Mexican.

100. *V. PAUCIFLORA*, Hemsl. Biol. Cent.-Am. Bot. ii. 189 (1881).
V. cymosa, Gray, Proc. Am. Acad. xxi. 390 (1886). — Cerro de Pinal,
Seemann, no. 1468; S. W. Chihuahua, *Palmer*, no. 135.

+ + Perennial herb: leaves serrate, scabrous: S. American.

101*. *V. GRISEBACHII*, Baker, l. c. 214. *V. helianthoides*, Griseb.
 Symb. Fl. Argent. 194, not Michx. — Argentine Republic, Entre Rios,
 to Concepcion del Uruguay (acc. to Baker, l. c.).

* * Leaves alternate, bipinnatifid: Brazilian.

102*. *V. BIPINNATIFIDA*, Baker, l. c. 213. — Minas Geraës, Brazil,
Martius.

* * * Leaves alternate, undivided, auriculate at the base: Mexican.

103. *V. AURICULATA*, DC. Prodr. v. 617; Klatt, Leopoldina, xxiii.
 144. — Tehuantepec, *Andrieux*, no. 302; Villa Alta, *Liebmann*,
 no. 211.

* * * * Leaves alternate, undivided, exauriculate.

+ Leaves very large, 1.5 to 3 dm. long, 4 to 8 cm. broad.

+ + Brazilian.

= Achenes broadly winged.

104*. *V. FLORIBUNDA*, Gardner in Hook. Lond. Jour. Bot. vii. 407;
 Baker, l. c. 212. — Minas Geraës, *Gardner*, no. 4927.

= = Achenes narrowly winged.

105*. *V. NICOTIANÆFOLIA*, Baker, l. c. — Brazil without locality,
Pohl, no. 621.

+ + Andean.

106. *V. ARBOREA*, HBK. l. c. 202; DC. l. c. 617. *V. Cumingii*,
 Sch. Bip. Linnæa, xxxiv. 528. — Mountains about Quito, *Humboldt &*
Bonpland; near Sorata, Bolivia, *Mandon*, no. 56.

+ + Leaves smaller.

+ + Leaves sparingly pubescent beneath.

= Leaves "sessile": heads numerous.

107*. *V. GUIANENSIS*, Baker, l. c. 211. — British Guiana, *Schom-*
burgk, nos. 194, 654. — Not seen by the writers.

= = Leaves narrowed below to distinct petioles: corymbs few-headed.

108. *V. SCHOMBURGKII*, Sch. Bip. in Schomb. Faun. Fl. Brit. Guiana, 1078 (name only); Klatt, l. c. xx. 94. — British Guiana, *Schomburgk*, no. 993. A form of the preceding?

++ ++ Leaves densely pubescent beneath.

109. *V. CLAUSSENI*, Sch. Bip. in Baker, l. c. 212. — Central Brazil, *Claussen*, *Riedel*, *Warming*, *Langsdorf*.

DOUBTFUL SPECIES.

V.? *ÆSTUANS*, Lam. Dict. iii. 262, DC. Prodr. v. 618 (*Inula æstuanis*, L. Spec. ed. 2, ii. 1236), known from Plum. ed. Burm. t. 41, f. 2, is wholly doubtful and probably not of this genus. It has very numerous long narrow linear rays and a multiseriate involucre.

V. ARGENTEA, Bertol. Fl. Guat. 435, if (as described) with neutral ray-flowers and triangular upwardly villous achenes, is probably an *Encelia*.

V. ARGENTEA, Gaud. in Freyc. Voy. Bot. 463, is a very imperfectly characterized plant of the Marian Islands.

V. CONYZOIDES, Trew, Pl. Rar. 8, t. 6 (1763), without locality, does not appear to have been recognized by any subsequent author. We have not had access to the work in which it is figured.

V. DECURENS, Vell. Fl. Flum. viii. t. 114, represented with racemose heads and a pappus of several capillary bristles, is surely not of this genus.

V. HUMBOLDTII, Spreng. Syst. iii. 577. *V. helianthoides*, HBK. Nov. Gen. & Spec. iv. 204, not Michx. We have seen no material of this species and are unable to place it satisfactorily. It is supposed to come from Ecuador, and is probably related to *V. elegans*, but has leaves "glabrous above." The Mexican plants referred to this species by Klatt are doubtless distinct.

V.? *ILICIFOLIA*, Poir. Dict. viii. 459, of San Domingo, with opposite short-petiolate coriaceous dentate leaves, is still doubtful.

V. INVOLUCRATA, Rich. Tent. Fl. Abyss. i. 409, is of Abyssinia and of doubtful generic affinities.

V. MAMEANA, André, Rev. Hort. xiv. 16, f. 5 (1885), is a horticultural species described from the stem and foliage alone. There is no satisfactory evidence that it is of this genus.

V. MEGAPOTAMICA, Spreng. Syst. iii. 578; DC. Prodr. v. 618, of the Prov. Rio Grande, Brazil, but unmentioned in the Flora Brasiliensis, is not recognized.

V. POPULIFOLIA, Hill, Hort. Kew. 31, poorly known and probably, like the other Old World species, not really of this genus.

V. PROSTRATA, Hook. & Arn. Bot. Beech. 195, is a prostrate and creeping Chinese plant with somewhat triangular achenes.

V. SCANDENS, Roxb. Hort. Beng. 62, & Fl. Ind. iii. 441, is an E. Indian plant unrecognized by recent writers.

V. SCAPOSA, Jones, Zoe, ii. 248, with scapose chiefly 1-headed peduncles and large radical leaves arising from a tuberous root, is a very doubtful member of the genus, not seen by the writers.

V. TRIPLINERVIA, Vis. Nuov. Sag. Accad. Padova, v. 264, Walp. Rep. ii. 621, said to be Mexican, is unrecognizable from its insufficient characterization.

V. THIRADIATA, Vell. Fl. Flum. viii. t. 115, is altogether doubtful.

TRANSFERRED SPECIES.

V. ALTERNIFOLIA, Britton in Kearney, Bull. Torr. Club, xx. 485, is *Actinomeris squarrosa*, Nutt.

V. ANCISTROPHORA, Gray, Proc. Am. Acad. xix. 14 (1883), being *Ancistrophora Wrightii*, Gray, Mem. Am. Acad. ser. 2, vi. 457 (1859), is *V. Wrightii*, Griseb. Cat. Pl. Cub. 155 (1866), which should not be displaced by *V. Wrightii*, Gray, Proc. Am. Acad. xix. 12 (1883).

V. BRIDGESII, Rusby, Mem. Torr. Club, iv. 212, is *V. boliviana*, Klatt.

V. CYMOSA, Gray, Proc. Am. Acad. xxi. 390, is *V. pauciflora*, Hemsl.

V. HASTATA, Kellogg ex Curran, Bull. Calif. Acad. i. 140 (1885), is *V. venosa*, Greene, Bull. Torr. Club, ix. 110 (1882).

V. HOOKERI, Klatt, Leopoldina, xx. 92, being *V. helianthoides*, H. & A. in Hook. Jour. Bot. iii. 316, not DC., is *V. Arnottii*, Baker in Mart. Fl. Bras. vi. pt. 3, 215.

V. LINIFOLIA, L. Syst. Nat. ed. 10, ii. 1226, founded on t. 149, f. 3 of Sloane's Hist. Jam., is *Pectis linifolia*, L., which rests on the same plate.

V. OAXACANA, Klatt, l. c. xxiii. 144, not DC., is *V. olivacea*, Klatt.

V. OVATA, Gray, Proc. Am. Acad. xix. 13, is *V. pterocaula* [Moc. & Sess.] DC.

V. PANICULATA, Heller, Cat. N. Am. Pl. 8, not Poir., is *Actinomeris alba*, Torr. & Gray.

V. PERSICIFOLIA, Klatt, Leopoldina, xx. 93, not DC., is *V. virgata*, Cav.

V. PINNATIFIDA, Gray in Wats. Proc. Am. Acad. xxii. 428 (Palmer's no. 698 from Jalisco), certainly not of Cav., is probably sterile *Montanoa grandiflora*, Sch. Bip.

V. PODOCEPHALA, Gray, Pl. Wright. ii. 92, is *Zexmenia podocephala*, Gray, Syn. Fl. i. pt. 2, 286.

V. SARTORII, Sch. Bip. in Klatt, l. c. xxiii. 143, is *V. olivacea*, Klatt.

V. SCANDENS, Klatt, Leopoldina, xxv. 106, is acc. to Klatt, Ann. Natur. Hofmus. Wien, ix. 362, *Salmea Eupatoria*, L.

V. TOMENTOSA, DC. Prodr. v. 614, imperfectly described and without exact locality, may be doubtfully referred to *V. sublobata*, Benth.

V. TRIDENTATA, Spreng. l. c. 577, is *Aspilia buphthalmiflora*, Griseb.

V. TUBEROSA, Klatt, Ann. Natur. Hofmus. Wien, ix. 361, is *Zexmenia aurea*, Benth. & Hook. f. Gen. ii. 373 (*Wedelia? aurea*, D. Don, Bot. Mag. t. 3384; *Verbesina aurea*, DC. Prodr. v. 613).

III.—SOME NEW SPECIES, EXTENDED RANGES, AND NEWLY NOTED IDENTITIES AMONG THE MEXI- CAN PHANEROGAMS.

By J. M. GREENMAN.

Eleocharis aciculariformis. Perennial: rhizomes dark brown, creeping, rather stout, freely branched: culms 5 to 8 cm. high, tufted at the nodes of the rhizome, vaginate at the base: sheaths reddish-brown below, hyaline above: spikes elliptic-ovate, 4 to 6 mm. long, about 12-flowered; scales ovate, obtuse, somewhat compressed, green on the back with reddish-brown sides and scarious margins: setæ 3, a little over 1 mm. in length: achenes oblong-obovate, about 1 mm. long, rather abruptly narrowed at the summit, longitudinally ribbed, and transversely striated: tubercle about one third as broad as the achene. — Collected by C. G. Pringle in the Valley of Mexico, Federal District, 7 May, 1898, no. 6818.